Explanation of What's Behind New York's Draft Phase III Watershed Implementation Plan Nitrogen and Phosphorus Planning Targets

1. **How did the Chesapeake Bay Program Office staff factor in New York's original 2010 Chesapeake Bay TMDL equity request into New York's draft Phase III WIP planning targets?**

The Chesapeake Bay Program Office staff re-ran the Partnership's allocations methodology setting New York to a 1985 baseline (all other jurisdictions were based on a 2010 baseline) using the corrected versions of the Partnership's Phase 6 models. It was determined that New York would receive 0.9985 million pounds of nitrogen to address its original request for equity, confirming, once again, the decisions made in the 2010 Chesapeake Bay TMDL. Therefore, a total of an additional 1 million pounds, plus the additional 100,000 pounds of phosphorus, were factored into New York's proposed final Phase III planning targets for nitrogen and phosphorus.

2. **Why was there such a significant increase in New York's 1985 base loads for nitrogen compared with much smaller changes observed in Pennsylvania and the other jurisdictions between the Partnership's Phase 5 and Phase 6 suite of models?**

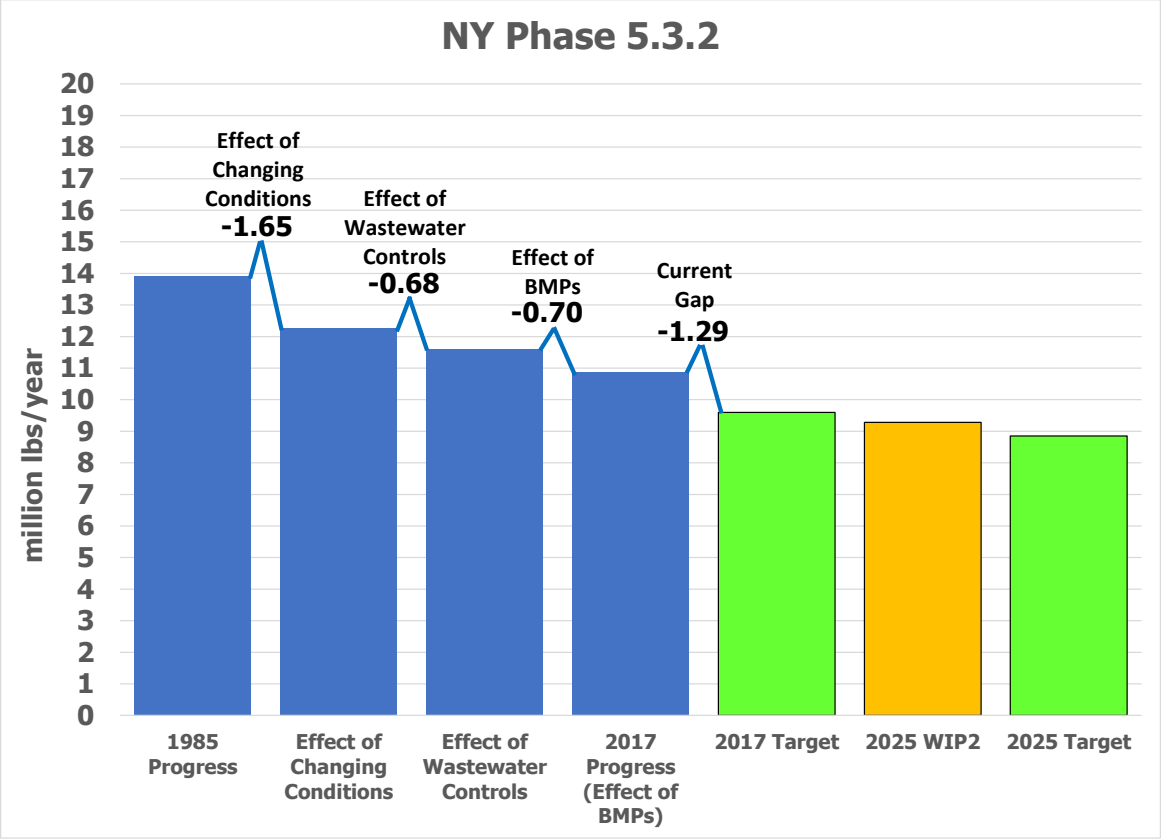
New York's base loads increased because the percentage of load that reaches the Chesapeake Bay's tidal water increased significantly in the Partnership's Phase 6 watershed model relative to the Phase 5 watershed model. The reason for this change was more recent published scientific findings have documented streams deliver a lot more nutrient loads downstream than previously thought. Making these changes also improved the Phase 6 watershed model's calibration.

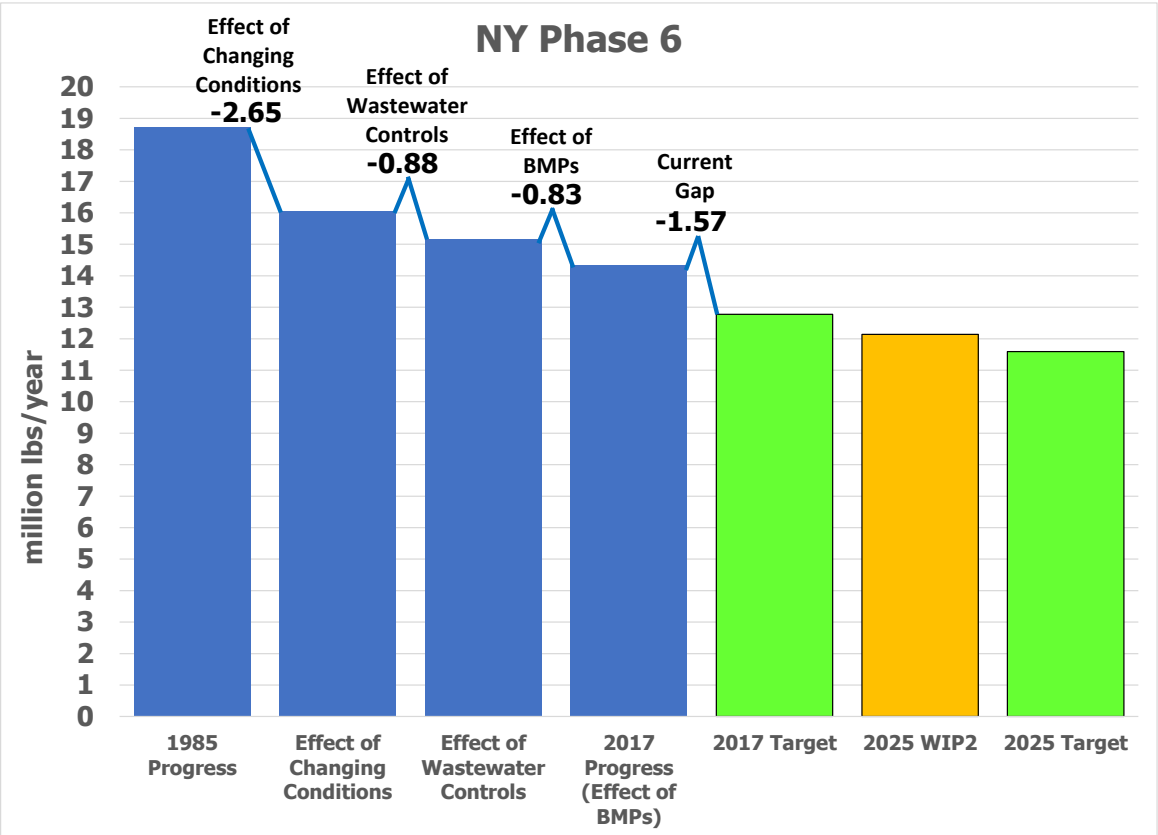
For example, the percent of nitrogen load leaving the Partnership's Chesapeake Bay watershed water quality monitoring network station at Towanda, Pennsylvania, that reached Chesapeake Bay tidal waters was 62% in the Phase 5 watershed model. In the Phase 6 watershed model, this delivery of load increased to 80%, a number more in line with recent scientific literature as described above.

This change in base loads does not necessarily mean a higher or lower required level of BMP implementation under the revised Phase III WIP planning targets. The planning target calculation requires a percentage change from a base load. Therefore, if the base load increases, then the allowable pollution increases as well and the pollutant load reduction is a percentage of that allowable load.

3. **Can you please illustrate what's behind the changes between New York's Phase 5/Phase II WIP planning targets and the Phase 6/Phase III WIP planning targets?**

The charts below show the change in New York's model estimated nitrogen loads from 1985 to 2017, comparing Phase 5.3.2 model results with Phase 6. The blue bars quantify relative effects on load changes from: 1) changing conditions; 2) wastewater discharges; and 3) reported BMP implementation. The changing conditions include factors such as changing nutrient application rates to crop and pasture because of changes in the amount of manure and fertilizer used; changes in crop types and acres; increases in population leading to greater stormwater and septic loads, etc.


NY Phase 5.3.2
million lbs/year
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Effect of Changing Conditions -1.65
Effect of Wastewater Controls -0.68
Effect of BMPs -0.70
Current Gap -1.29
1985 Progress
Effect of Changing Conditions
Effect of Wastewater Controls
2017 Progress (Effect of BMPs)
2017 Target
2025 WIP2
2025 Target

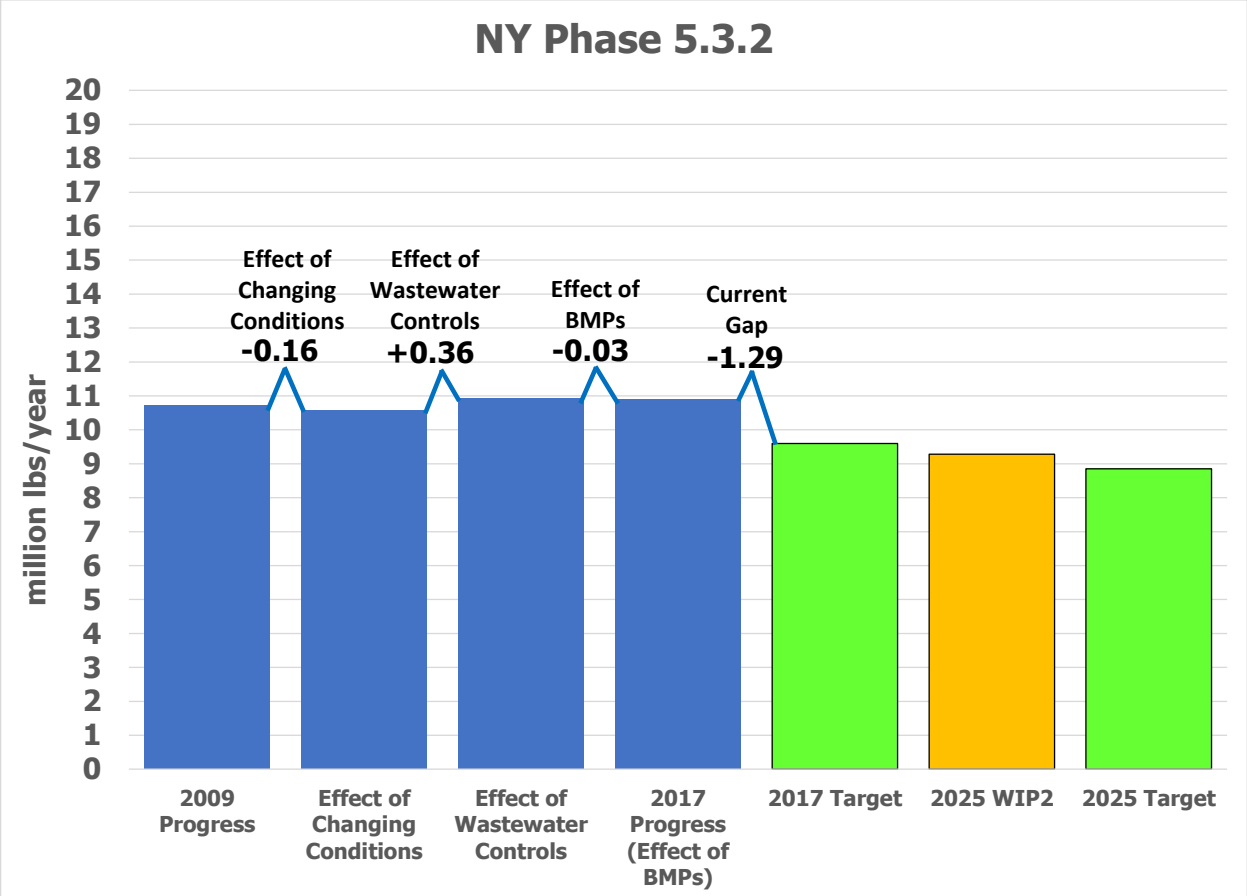

NY Phase 6
million lbs/year
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Effect of Changing Conditions -2.65
Effect of Wastewater Controls -0.88
Effect of BMPs -0.83
Current Gap -1.57
1985 Progress
Effect of Changing Conditions
Effect of Wastewater Controls
2017 Progress (Effect of BMPs)
2017 Target
2025 WIP2
2025 Target

The Phase 6 watershed model shows greater benefits from the changing conditions (loss of growth in the case of New York), wastewater controls, and reported BMP implementation – compared to the Phase 5 watershed model – with the benefits measured in absolute load reductions. In other words, the Partnership's Phase 6 model is directly benefiting New York by more accurately accounting for all the changes to the landscape as well as the pollutant load reductions actions put on the ground since 1985.

The difference in the gaps between current loads and the targets between the Phase 5 and 6 models are due to changes between models, scenario results (e.g., No-Action and E3), and the cumulative effect on meeting Chesapeake Bay water quality standards – all relative to the changes in state-basins in other jurisdictions.

4. Why there was an increase in the Phase 5 model estimated load between 2009 and 2017?

The chart below visualizes the relative effect on Phase 5.3.2 model load changes from 2009 to 2017 due to: 1) changing conditions; 2) wastewater discharges; and 3) reported BMP implementation. The increase in nitrogen loads from 2009 to 2017 is due to the reported increase in wastewater discharges over that period, specifically, a significant increase from the Binghamton-Johnson wastewater treatment facility since 2009. Four smaller facilities' discharges increased over the past year.



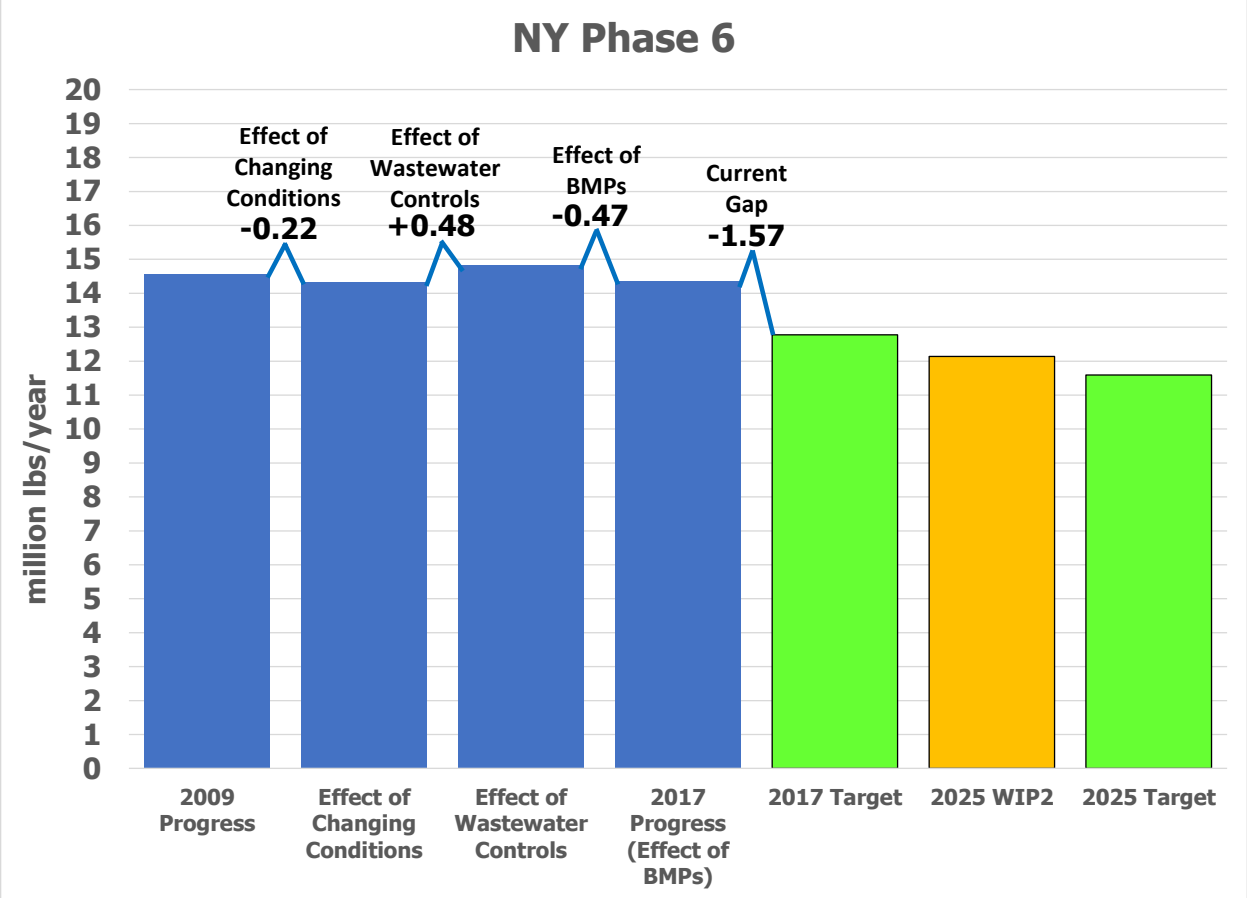
5. Why was there such a small decrease in the Phase 6 model estimated load between 2009 and 2017?

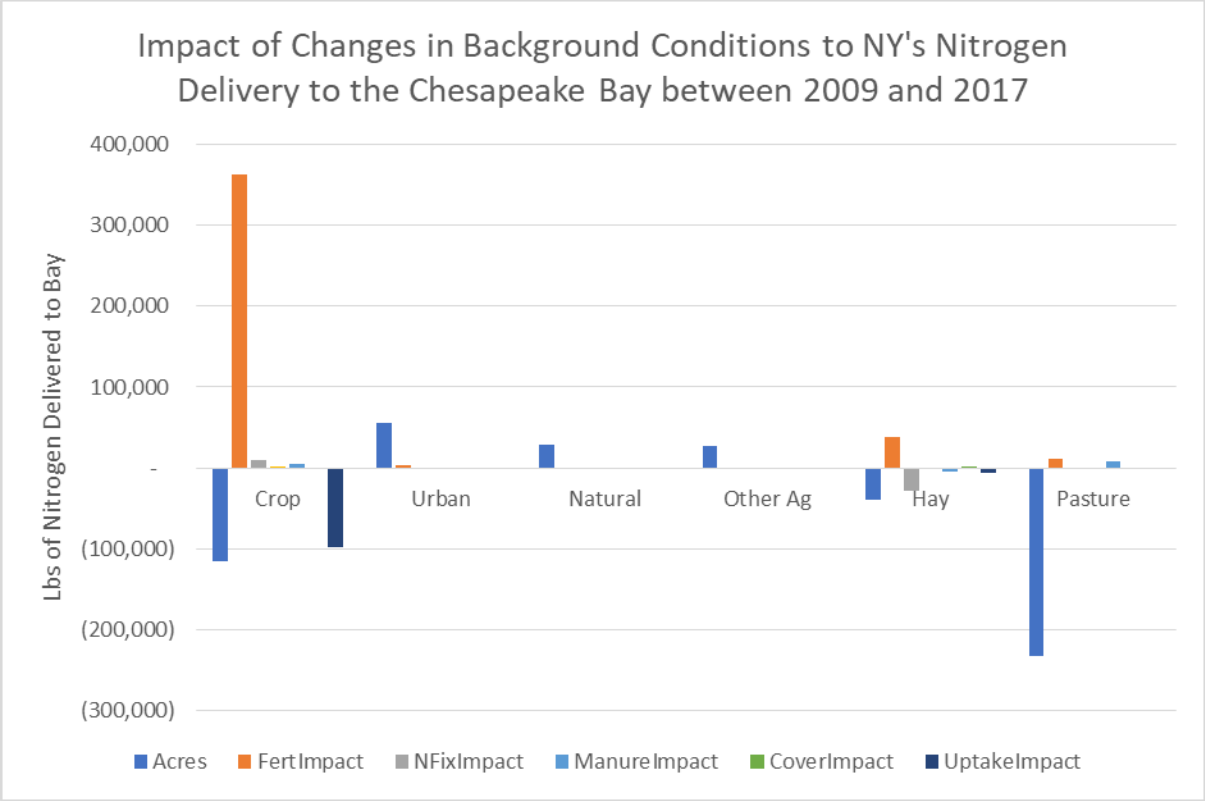
The charts below quantify the causes of the change in nitrogen loads 2009-2017 under the Phase 6 watershed model. Beneficial nitrogen load reductions from reported BMP implementation and changing conditions were diminished by increases in wastewater discharges.

Acres of crop, hay and pasture decreased between 2009 and 2017, while urban acres increased slightly over this same time period.

These acreage decreases were mostly offset with increases in cropping intensity (yields, and types of high-yielding crops) which led to more estimated fertilizer inputs. These fertilizer inputs on crop and hay were nearly enough to wipe out all decreases in acres. This points to a potential emerging source area that should be mitigated by practices described in New York's Phase III WIP. New York is not alone in this increase in crop intensity and fertilizer increase, as other states across the watershed (e.g., Maryland, Delaware) are seeing similar patterns.

Finally, changes in manure, uptake, fixation and cover (by plants) had very little impact on the change in New York's loads between 2009 and 2017.





6. Why when New York's Phase II WIP's BMPs were run through the Phase 6 Chesapeake Bay watershed model were the resultant nitrogen loads fall short of meeting New York's draft Phase III WIP planning target when most other jurisdictions ended up with a surplus of reductions?

New York's Phase II WIP nitrogen and phosphorus loads fell short of the New York's Phase II nitrogen and phosphorus planning targets as well—see the charts below. New York has essentially had two goals in place for the measurement of progress. The first is the product of New York's Phase II WIP commitments and the second is based on meeting New York's Phase II WIP Planning Targets necessary to meet Chesapeake Bay water quality standards. The only difference between the two is the additional reductions in wastewater discharged loads needed to achieve New York's Phase II WIP planning targets necessary to meet water quality standards. The table below shows these two goals for 2025 and where New York is now (2017) with respect to these two goals based on the Phase 5.3.2 model. The results of running New York's Phase II WIP BMPs through the corrected Phase 6 model are found on pages 8 (nitrogen) and 9 (phosphorus).

New York Loads and Goals (Phase 5.3.2 model)

	Nitrogen							
	2009	2016	2017	2017	2017	2017 60% Target	2025	2025
	Progress	Progress	Progress	Progress II	60% Target	Based on WIP	Target	WIP
Source	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)
Agriculture	4.54	4.39	4.20	4.20	3.64	3.64	3.04	3.04
Urban Runoff	1.24	1.26	1.26	1.26	1.18	1.18	1.14	1.14
Wastewater+CSO	1.49	1.71	1.85	1.85	1.31	1.57	1.19	1.62
Septic	0.32	0.36	0.35	0.35	0.32	0.32	0.32	0.32
Forest+	3.13	3.21	3.22	3.22	3.15	3.15	3.16	3.16
AllSources	10.72	10.93	10.88	10.88	9.60	9.85	8.85	9.28

	Phosphorus							
	2009	2016	2017	2017	2017	2017 60% Target	2025	2025
	Progress	Progress	Progress	Progress II	60% Target	Based on WIP	Target	WIP
Source	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)	(M lbs/year)
Agriculture	0.527	0.422	0.405	0.405	0.429	0.429	0.364	0.364
Urban Runoff	0.122	0.108	0.108	0.108	0.107	0.107	0.098	0.098
Wastewater+CSO	0.190	0.102	0.117	0.117	0.115	0.132	0.065	0.094
Forest+	0.117	0.118	0.118	0.118	0.116	0.116	0.116	0.116
AllSources	0.956	0.749	0.748	0.748	0.768	0.786	0.643	0.672

	Sediment							
	2009	2016	2017		2017		2025	
	Progress	Progress	Progress		60% Target		Target	
Source	(M lbs/year)	(M lbs/year)	(M lbs/year)		(M lbs/year)		(M lbs/year)	
Agriculture	132	128	124		113		100	
Urban Runoff	100	97	97		112		119	
Wastewater+CSO	3	3	3		2		2	
Forest+	97	98	98		88		82	
AllSources	332	325	322		315		304	

Loads meet trajectory targets (>= 60% of 2009-2025 reduction)
Loads don't meet trajectory targets but are within 5 percentage points (55%-60%)
Loads don't meet trajectory targets (<55% of 2009-2025 reduction)

7. Can you explain how the 9.5% change in E3 for the stormwater model correction which translates to the 250,000 pounds of additional nitrogen load reductions for New York?

The Runoff Reduction BMP for managing stormwater was incorrect in the 2017 version of the Partnership's E3 (or everything by everyone everywhere) scenario. The E3 scenario has been corrected, factored into the allocations methodology, and included in the final proposed Phase III WIP planning targets. The Partnership's Urban Stormwater Workgroup defined this BMP as follows for E3:

- Stormwater Management for New Development – 100% of new development has Runoff Reduction BMPs sized for 2.0 inch Impervious area

- Stormwater Management for Retrofits – Runoff Reduction Retrofits sized to treat 1.5 inch Impervious area for 75% of each urban land use type (accommodates physical limitations)

Given the amount of new development varies among jurisdictions, therefore the % implementation level for Runoff Reduction BMPs—as a composite of new development and retrofits – will not be the same among jurisdictions. These are the 78% - 86% numbers in the last column in the table below.

For jurisdictions that had a big difference in the percent composite implementation level between the 2017 E3 scenario and the corrected 2018 E3 scenario, the 2017 E3 inputs to the model were incorrect. The BMP acres in the input files were distributed across entire counties which had only a portion of their land inside the Chesapeake Bay watershed. When corrected, the BMPs were correctly placed only on the land area of each county within the Chesapeake Bay watershed.

This is why there's less difference between 2017 E3 scenario and corrected 2018 E3 scenario in Maryland and the District of Columbia. The District is entirely in the watershed and 94% of Maryland is in the Chesapeake Bay watershed. In all the other watershed jurisdictions—DE, NY, PA, VA, WV— there's a much greater area in counties that straddle the Chesapeake Bay watershed. These were the counties where Runoff Reduction BMPs were wrongly applied to areas of each county outside of the watershed boundary in the 2017 E3 scenario.

Finally, for the Runoff Reduction BMP, acres are needed for the treated area, impervious area + volume. This BMP does not have units of % for the inputs as with most E3 BMPs. The workgroup definition is in percentages so there needed to be a translation through calculations.

In the table below, an increase in implementation = decrease in E3 load = greater controllable load = greater level of effort (all relative among jurisdictions).

Changes in Implementation of Runoff Reduction BMPs (Stormwater Management) in the 2017 E3 Scenario Versus the Final Corrected 2018 E3 Scenario

	Implementation Level (% of Urban Land)	
Jurisdiction	2017 E3 Scenario	Final E3 Scenario
DE	22	84
MD	81	82
NY	34	81
PA	61	82
VA	74	82
WV	72	86
DC	78	78

The greatest increases in the level of implementation of the 2018 E3 scenario to due corrections to the Runoff Reduction BMP were in Delaware and New York. The greater controllable load in the corrected 2018 E3 scenario compared to 2017 E3 scenario and compared to the changes in other jurisdictions led to a slightly different position for New York on the "hockey stick" allocation chart relative to other state-basins, leading to a slightly higher relative effect of New York's nitrogen loads on Bay water quality.

Nitrogen

Draft Phase III WIP Planning Target	11.59	
Factoring in Model Corrections	0.27	
Factoring in Ag Tax Ditch Changes	0.01	
Proposed Final Phase III WIP Planning Target	11.31	
Current 2017 Progress Scenario	14.35	
Corrected 2017 Progress Scenario	14.32	
Additional Reductions Resulting from Corrections	0.03	
Corrected 2017 Progress Scenario	14.32	
Proposed Final Phase III WIP Planning Target	11.31	
Remaining Reductions	3.01	(2.76)*
Remaining Reductions	3.01	
2025 Projected Growth in Loads	-0.74	
Binghamton-Johnson Fully Operational	- 0.25	
Updated Remaining Reductions	2.02	

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Phase II WIP with Model Corrections	12.09
Proposed Final Phase III WIP Planning Target	11.31
Remaining Reductions	0.78

*Remaining reductions based on the current draft Phase III WIP planning targets without factoring in the model corrections or changes due to agriculture tax ditches.

Phosphorus

Draft Phase III WIP Planning Target	0.606	
Factoring in Model Corrections	0.018	
Factoring in Ag Tax Ditch Changes	0.000	
Proposed Final Phase III WIP Planning Target	0.587	
Current 2017 Progress Scenario	0.638	
Corrected 2017 Progress Scenario	0.632	
Additional Reductions Resulting from Corrections	0.005	
Corrected 2017 Progress Scenario	0.632	
Proposed Final Phase III WIP Planning Target	0.587	
Remaining Reductions	0.045	(0.032)*
Remaining Reductions	0.045	
2025 Projected Growth in Loads	-0.006	
Binghamton-Johnson Fully Operational	-0.005	
Updated Remaining Reductions	0.034	

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Phase II WIP with Model Corrections	0.524	
Proposed Final Phase III WIP Planning Target	0.587	
Remaining Reductions	-0.063	

*Remaining reductions based on the current draft Phase III WIP planning targets without factoring in the model corrections or changes due to agriculture tax ditches.